

REMARKS

By this amendment, Applicant proposes amending claims 13 and 19 as set out above. Applicant respectfully submits that the above amendments do not raise any new issues requiring further search or consideration. Claim 13 has been amended to correct a minor indefiniteness issue identified by the Examiner in the Final Action. Claim 19 has been amended to specify the latching effects of the invention, which have been extensively considered by the Examiner, for example, in connection with claim 24. Support for this amendment can be found in the Applicant's original disclosure at, for example, page 4, lines 19-24.

Applicant appreciates the Examiner's indication that the drawings filed April 28, 2005 have been accepted. In view of the amendments proposed above and the following remarks, Applicant respectfully requests reconsideration and timely withdrawal of the pending rejections of the remaining claims for the reasons discussed below.

35 U.S.C. §112 Rejection

Claims 13, 15, and 18 stand rejected under 35 U.S.C. § 112, second paragraph, for allegedly being indefinite for failing to particularly point out and the distinctly claim the subject-matter which Applicant regards as the invention. Applicant proposes amending claim 13 to obviate the antecedent basis issue by reciting "the first and second solenoid coils" instead of the "open and closed solenoid coils." Applicant respectfully submits that this amendment, which does not narrow or otherwise change the scope of the claims, puts claims 13, 15, and 18 in clear compliance with the requirements of 35 U.S.C. § 112. Therefore, withdrawal of the rejection under § 112, second paragraph is respectfully requested.

35 U.S.C. §102(b) Rejection

Claims 1, 13, and 24 stand rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by U.S. Patent No. 5,251,671 to Hiroki. Applicant respectfully traverses this rejection for at least the following reasons.

In order for a rejection under 35 U.S.C. § 102(b) to be proper, a single reference must disclose each and every claimed feature. Thus, if a cited reference fails to disclose one or more claimed features, then the rejection under § 102(b) is improper.

Independent claims 1, 13, and 24, recite combinations of features including, respectively, “the spool including a mechanism which at least minimizes fluid accumulation in a gap between an end of the spool and at least one of the opposing solenoid coils” (claim 1), “means for minimizing fluid accumulation between a contact surface area between the spool and one of the first and second solenoid coils” (claim 13)¹, and “a longitudinally slidable spool including an element reducing or minimizing latching effects between the spool and end caps of the fuel injector” (claim 24). (Emphasis added.) Accordingly, valve spool 4 does not include an element reducing or minimizing “fluid accumulation” or “latching effects” as recited in the claims.

The Final Action states on pages 2 and 3 that Hiroki discloses a valve body 1, opposing solenoid coils 51a, 51b, 53a, 53b positioned at respective ends of the valve body, a valve spool 4 positioned within a valve bore 11 in the valve body between the solenoids, and seal rings 81a, 81b that provide a liquid tight seal between valve body 1 and actuator casings 52a, 52b. The Final Action states on page 3 that pressure control valve of Hiroki would inherently reduce

¹ This feature of claim 13 is in means plus function format and must be interpreted in accordance with 35 U.S.C. § 112 ¶ 6, to cover at least the disclosed seal 115 included in the spool 110 and the special shape 205 of a portion of the spool 110 near one of the open or closed coil assemblies 103A, 103B.

latching effects between the valve spool 4 and the end caps of the fuel injector due to the seal rings 81a, 81b, but does not address that the rings are not included in or located on the valve spool 4. Hiroki, however, fails to disclose at least these limitations of independent claims 1, 13, and 24 as set out above.

The Final Action erroneously suggests that the seal rings 81a, 81b reduce latching effects in the pressure control valve Hiroki. Even assuming that was true, seal rings 81a, 81b are provided in actuator casings 52a, 52b and axial ends of valve body 1 (col.3: 29-32), and are not part of or included with valve spool 4 as can be seen in FIG. 1, and as is required by independent claims 1, 13, and 24.

Therefore, Applicant respectfully requests that the Examiner withdraw the rejection of claims 1, 13, and 24 under 35 U.S.C. § 102(b) because Hiroki fails to disclose each and every feature of the claimed invention as a whole. Moreover, for the same reasons discussed below in addressing the § 103 rejections of claims 2, 3, and 15, it would have not been obvious to combine Hiroki with the O-rings of Magee or Maranzano.

Also, there is another reason why Hiroki fails to disclose either “a mechanism which at least minimizes fluid accumulation in a gap between an end of the spool and at least one of the opposing solenoid coils,” or “means for minimizing fluid accumulation between a contact surface area between the spool and one of the first and second solenoid coils,” as recited in claims 1 and 13, respectively. Hiroki is directed to a pressure control valve that is useful in, for example, an automotive power steering system. (Col. 1: 10-11.) Seal rings 81a, 81b provide a liquid tight seal between actuator casings 52a, 52b of the actuator assemblies 5a, 5b and the axial ends of valve body 1. (Col. 3: 29-32.) These seals are provided to prevent fluid leakage to

ambient that would reduce the pressure of power steering fluid disposed in the pressure control valve of Hiroki.

Thus, Hiroki discloses a valve control body that promotes fluid accumulation in the gap at an axial end of the valve spool 4, and could not operate as intended if this fluid accumulation was minimized. Piston bores 63a, 63b at the axial ends of valve spool 4 are oriented in alignment with feedback bores 61a, 61b disposed in valve spool 4 that are in fluid communication with output ports 11a, 11b. (Col. 4: 5-8.) Pressurized fluid flows from the output ports 11a, 11b through the piston bores 63a, 63b to exert pressure on respective inner ends 65a, 65b of pistons 64a, 64b. (Col. 4: 9-12.) This fluid exerts pressure onto pilot piston 64a and adjustable plug 8a. (Col. 4: 66-67.) The pressurized fluid exerting pressure against pilot piston 64a and plug 8a serves as a reacting force to terminate the axial movement of valve spool 4. (Col. 4: 67-68; col. 5: 1.) Thus, Hiroki requires fluid accumulation at the axial ends of the valve spool 4 to terminate its axial movement in either direction and operate.

Accordingly, Hiroki does not disclose and cannot teach a valve control body that minimizes fluid accumulation in a gap between an end of the spool and at least one of the opposing solenoid coils” as recited in claim 1, or includes “means for minimizing fluid accumulation between a contact surface area between the spool and one of the first and second solenoid coils” as recited in claim 13. Hence, the rejection of claims 1 and 13 under § 102(b) must also be withdrawn.

Further, Applicant respectfully submits that claims 2-4, 15, and 18 also are not anticipated by Hiroki, by virtue of their dependencies on claims 1 and 13, as well as for reciting additional patentably distinct features, such as “a seal seated within a groove of the spool and in slidable contact with a wall of the bore of the control body.” Since, as discussed in more detail

below, none of the other prior art of record, whether taken alone or in combination, discloses or suggests the features of claims 1, 13, and 24, it is respectfully submitted that these claims, plus their dependent claims, are in condition for allowance.

35 U.S.C. §103(a) Rejections

Claims 2-4, 15, and 18 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No.5,251,671 to Hiroki as applied to claims 1 and 13 and further in view of U.S. Patent No. 5,133,386 to Magee. Claims 2-4, 15, and 18 also stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No.5,251,671 to Hiroki as applied to claim 1 and further in view of U.S. Patent No. 5,207,245 to Marazano. Claims 19 and 20 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 5,964,406 to Zuo in view of Magee. Applicant traverses these rejections for at least the reasons noted below.

In order to reject a claim under 35 U.S.C. §103(a), the three basic criteria must be met to establish a *prima facie* case of obviousness:

First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Claims 2-4, 15, and 18

Applicant respectfully submits that claims 2-4, 15, and 18, are allowable by virtue of their dependency on allowable claims 1 and 13, as discussed above.

Also, as noted above, Hiroki fails to disclose or suggest a valve control body “minimizing fluid accumulation between the spool and at least one solenoid coil” or “means for minimizing fluid accumulation between a contact surface area between the spool and one of the first and second solenoid coils.” The secondary references relied upon by the Examiner for the rejection of these claim under § 103 are not cited for and do not supply these missing features to overcome the deficiencies of Hiroki. Accordingly, the Final Action fails to establish a *prima facie* case of obviousness at least because the proposed combinations, fail to disclose or suggest each and every feature of these claims.

Moreover, the Applicant respectfully submits that the proposed combinations of Hiroki with Magee or Maranzano would not have been obvious, but actually teach away from the invention because they change the principle of operation of Hiroki. (MPEP § 2143.01.) The Final Action on pages 4 and 5 proposes modifying the pressure control valve by substituting the seal rings 81a, 81b with the O-rings 19 of Magee or the O-ring seal 46 of Maranzano disposed in a groove proximate an end of a valve body. The Final Action further suggests that such an arrangement would inherently reduce latching effects.

Seal rings 81a, 81b, however, provide a liquid tight seal between the valve body 1 and actuator casings 52a, 52b. (Col. 3: 29-32.) Moving the seal rings 81a, 81b onto the valve spool 4 as proposed by the Examiner would eliminate the liquid tight seal taught by Hiroki. Such a modification would destroy a primary function and the operability of Hiroki. In addition, as

described above, modifying valve spool 4 with the O-ring of Magee or Maranzano may reduce fluid accumulation in the piston bores 63a, 63b at the spool's axial ends, which is contrary to the basic operation and function of Hiroki as it would reduce the force caused by fluid pressure acting on pistons 64a, 64b and adjustable plugs 8a, 8b that is required to stop the axial movement of the spool 4. (Col. 4: 63-68; col. 5: 1.) Accordingly, Applicant respectfully submits that claims 2-4, 15, and 18 are allowable because proposed modifications of Hiroki with Magee or Maranzano would not have been obvious because they are impermissible hindsight reconstructions that fundamentally change the principle of operation of Hiroki.

Claims 19 and 20

Amended independent claim 19 recites a combination of features, including “a slidably mounted spool arranged the first and second solenoid coils, the spool including a mechanism which at least minimizes fluid accumulation between an end of the spool and at least one of said first and second solenoid coils to reduce or minimize latching effects between the spool and at least one of the first and second solenoid coil.”

The Final Action restates its previous rejection of claims 19 and 20 over Zuo in view of Magee from the December 29, 2004 non-final Action. The Examiner maintains on page 6 of the Final Action that it would have been obvious to modify the spool body 30 of Zuo with the O-ring 19 of Magee based solely on the knowledge of a person having ordinary skill in the art. On page 7 of the Final Action, the Examiner states that Applicant's previous arguments regarding latching effects in its April 28, 2005 reply were not considered because that feature was not recited in either claim 19 or 20. The rejection of claims 19 and 20 is traversed for at least the following reasons.

A *prima facie* case of obviousness can only be established if there is a motivation or suggestion to combine the references. There are three possible sources for a motivation to combine: (1) the nature of the problem to be solved; (2) the teachings of the prior art; and (3) the knowledge of persons of ordinary skill in the art.” See MPEP § 2143.01. The level of skill in the art cannot be relied upon to provide suggestion to combine references. *Id.* The mere fact references can be combined is not enough to establish obviousness unless the prior art suggests the desirability of the combination. *Id.*

Applicant respectfully submits once again that the required motivation to combine references is missing. The Final Action does not provide any evidence of the knowledge of one of ordinary skill in the art that would indicate the proposed modification would have been obvious. The Final Action appears to concede that both Zuo and Magee themselves do not provide any motivation or suggestion for the proposed combination. Therefore, Applicant respectfully submits that the combination of Zuo with Magee is improper and unsupported.

Further, Applicant has now explicitly added the feature of a mechanism “to reduce or minimize latching effects between the spool and at least one of said first and second solenoid coils,” similar to previously considered claim 24. Hence, no new issues are raised by this Amendment. Applicant again respectfully submits that a person having ordinary skill in the art would not look to combine the slidable spool 30 of Zuo, or the slidable spool of any other fuel injector, with the O-ring 19 disposed in the longitudinally fixed spools 12, 13, 15 of Magee because a stationary spool in a servo valve is not pertinent to and does not assist in solving the problem with which Applicant is concerned, *i.e.*, minimizing fluid accumulation between a solenoid and a longitudinally slidable spool to reduce latching effects. Thus, claims 19 and 20 would have not been obvious.

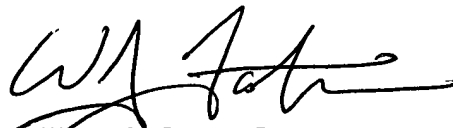
In view of the proposed amendment adding a feature regarding “latching effects” to claims 19 and 20, Applicant respectfully requests the Examiner to reconsider Applicant’s arguments regarding this feature submitted with its April 28, 2005 reply, which provide ample evidence showing that the requisite suggestion or motivation to combine Zuo with Magee is lacking.

Accordingly, Applicant respectfully requests the Examiner to withdraw the rejection of claim 19 under § 103 because the required suggestion or motivation to combine references missing. Thus, for at least this reason, Applicant respectfully submits that claim 19, and its dependent claim 20, are in condition for allowance.

CONCLUSION

In view of the foregoing amendments and remarks, Applicant submits that all of the claims are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue. The Examiner is invited to contact the undersigned at the telephone number listed below, if needed. Applicant hereby makes a written conditional petition for extension of time, if required. Please charge any deficiencies in fees and credit any overpayment of fees to **Attorney's Deposit Account No. 23-1951**.

Respectfully submitted,



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